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 Title: System and Method for Decoding Audio/Video Data such as DVD
 or/and DVB Data
 Assignee(s): National Semiconductor Corp.

Mountain View, California
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RESPONSE

Technology Center 2600

Sir:

This is in response to the Office Action mailed 30 April 2004 for the above patent application.

In reviewing the substitute specification submitted 11 February 2004, Applicants' Attorney noted several errors on pages S2, S5, S9, and S14 of the substitute specification. Rather than having the language "These messages include tags" as prescribed in the Amendment submitted 10 December 2003, paragraph 7 on page S2 of the substitute specification has the language "Those message include tags". Paragraphs 40 and 50 respectively on pages S6 and S9 of the substitute specification should respectively have the language "or tag" and "streams contain" as prescribed in the Amendment submitted 11 February 2004 for revising the text instead of the current language "or a tag" and "streams do contain". Finally, the portion of paragraph 73 on page S14 of the substitute specification should have the language "and/or an" as prescribed in the 11 February 2004 Amendment to Text rather than the current language "and/or and/or".

Enclosed are replacement specification pages R2, R6, R9, and R14 in which the preceding errors are corrected. Please respectively substitute replacement pages R2, R6, R9, and R14 for pages S2, S6, S9, and S14 of the substitute specification to create a corrected substitute specification.

The Office Action states that "The substitute specification filed 2/11/04 has not been entered because it does not conform to 37 CFR 1.125(b) and (c) because: **the statement as to a lack of new matter under 37 CFR 1.125(b) is missing**".

Pursuant to 37 CFR 1.125(b), Applicants' Attorney states that the substitute specification submitted 11 February 2004, as corrected here, contains no new matter. Accordingly, the substitute specification should now be entered.

The Office Action states that "The amendment filed 12/10/03, 12/23/03 and 2/11/04 are objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure". By the "amendment filed 12/10/03, 12/23/03 and 2/11/04", Applicants' Attorney assumes that the Examiner means (a) the Amendment submitted 10 December 2003, (b) the Supplemental Amendment submitted 23 December 2003, and (c) the Amendment submitted 11 February 2004 for revising the text, and does not include the further Amendment submitted 11 February 2004 for revising the drawings since the 11 February 2004 Amendment to Drawings does not present any revision(s) to the specification. Subject to this assumption, the objection to the 10 December 2003 Amendment, the 23 December 2003 Supplemental Amendment, and the 11 February 2004 Amendment to Text as introducing new matter into the disclosure is respectfully traversed.

The Office Action lists a number of revisions that allegedly cause new matter to be introduced into the disclosure. All of these revisions consist of revisions made to the specification by way of the 10 December 2003 Amendment and the 11 February 2004 Amendment to Text¹. In the Remarks sections of these two amendments, Applicants' Attorney explained why all of the specification revisions are supported in the original disclosure. Nonetheless, Applicants' Attorney will again explain why these specification

¹ The 23 December 2003 Amendment presents revisions to the claims but does not present any revision(s) to the specification. In particular, none of the objected-to revisions was made by the 23 December 2003 Amendment. Accordingly, no *bona fide* grounds are presented in the Office Action for objecting to the 23 December 2003 Amendment as introducing new matter into the disclosure.

revisions are supported in the original disclosure and thus do not introduce new matter into the disclosure.

The Examiner alleges that the material "messages about the stored data and their locations in the storage buffer. These message includes tags" at page 2, line 28, of the specification constitutes new matter. This material replaces "a tag" in the last paragraph on page 2 of the specification so that the amended paragraph reads:

The stream demultiplexer extracts the timing information embedded in each data pack of a data stream and, accordingly, generates messages about the stored data and their locations in the storage buffer. These messages include tags containing the decode time stamp, the presentation time stamp and the storage location of each data pack stored in the buffer.

On page 15 of the of the 10 December 2003 Amendment, Applicants' Attorney pointed out that:

The specification provides in the second paragraph on page 26 that "in one embodiment, SD 26 generates a message that audio or video data is stored in buffer 48 of Fig. 1 and ready for decoding even prior to storing all the audio or video data, respectively, in buffer 48". Aside from the recitation of stream-demultiplexer-generated messages in the just-quoted specification material, the specification itself does not appear to specifically define stream-demultiplexer-generated tags as "messages". However, originally filed device Claim 1 recited that the stream demultiplexer generates "messages about the stored data and their location in the data buffer" and that the control unit receives the so-generated messages. Originally filed method Claim 24 similarly recited "generating messages about the stored data bytes to a control unit".

Originally filed device Claim 3 and method Claim 26 further particularized the "messages" respectively recited in Claims 1 and 24. Claim 3 recited that "the messages generated by the stream demultiplexer about the audio and the video components of a DVD or DVB data byte are recorded on tags containing information about the time stamp of the data and their storage location in the data buffer". Claim 26 recited that "the act of generating messages about the stored data bytes to a control unit comprises generating tags containing information about the time stamps of the data and their storage location in the data buffer".

The original claims, i.e., the group of claims in the application as filed, constitute part of the original disclosure of a U.S. patent application. From the way that the term "messages" is utilized in original Claims 1, 3, 24, and 26 of the present application, it is clear that each of the "messages" recited in original Claims 1, 3, 24, and 26 is implemented by the "tag" recited in the last paragraph on page 2 of the specification. The specification revision

by which the objected-to language "messages about the stored data and their locations in the storage buffer. These message includes tags" was substituted for "a tag" in the last paragraph of specification page 2 merely conforms the specification to the original claims, specifically original Claims 1, 3, 24, and 26.

Under U.S. patent law, a U.S. patent application may be amended to conform one part of the original disclosure of the application to another part of the original disclosure. In particular, the specification may be amended to conform to the original claims. Since substitution of the language "messages about the stored data and their locations in the storage buffer. These message includes tags" for "a tag" in the last paragraph of specification page 2 conforms the specification to the original claims of the present application, the objected-to language "messages about the stored data and their locations in the storage buffer. These message includes tags" inserted at page 2, line 28, of the specification does not constitute new matter.

The Examiner alleges that deletion of the material "which is typically a first in first or (FIFO) buffer" at lines 4 and 5 on page 7 of the specification introduces new matter into the disclosure. Presumably the Examiner means the last clause of the sentence "SD 26 demultiplexes and depacketizes the data stream, storing the demultiplexed compressed audio and video data in data buffer 48, which is typically a First-In-First-Out (FIFO) buffer" in the paragraph bridging pages 6 and 7 of the specification.

On page 18 of the 11 February 2004 Amendment, Applicants' Attorney stated that:

Input buffer 48 contains multiple sub-buffers, thirty-two in the preferred embodiment as described on page 32 of the specification. In the paragraph bridging pages 7 and 8, the specification states that buffer 48 is a first-in/first-out ("FIFO") buffer. A FIFO has only one location at which data is accessed. Although certain portions of buffer 48 act as FIFOs for software purposes, the audio and video sub-buffers of buffer 48 are not implemented as FIFOs in hardware because the messages (tags) generated by stream demultiplexer 26 identify the locations where the encoded audio and video data is stored in buffer 48. There would be no need to provide such storage information if the audio and video portions of buffer 48 were hardware FIFOs. In light of this, references to buffer 48 as being a FIFO have been deleted from the specification [footnote deleted].

As explained in the foregoing part of the 11 February 2004 Amendment, buffer 48 contains thirty-two sub-buffers in the preferred embodiment of the invention. The paragraph bridging pages 22 and 23 of the specification discloses that these thirty-two sub-buffers

include an MPEG video sub-buffer, an audio sub-buffer, a sub-picture sub-buffer, a teletext sub-buffer, and sub-buffers for other data and control streams. Message queue "106", now renumbered "120", is another of the sub-buffers of buffer 48 as disclosed in the specification in the first full paragraphs on pages 17 and 26.

Different sub-buffers of buffer 48 are necessarily addressed simultaneously during certain portions of an audio/video decoding operation. As further explained in the foregoing part of the 11 February 2004 Amendment, a FIFO buffer has only one location at which data is accessed. If buffer 48 were actually a FIFO buffer, only one of the sub-buffers of buffer 48 could be addressed at any given time. It would then not be possible to simultaneously address different sub-buffers of buffer 48. Since different sub-buffers of buffer 48 are indeed simultaneously addressed at certain times, it is clear that buffer 48 is not actually a FIFO buffer.

In the paragraph bridging pages 6 and 7 of the specification, the language providing that buffer 48 is typically a FIFO buffer appears to be a terminology error on the part of the person(s) who prepared the present application. This terminology error was unfortunately repeated a number of times in the specification. Inasmuch as buffer 48 cannot actually be a FIFO buffer, deletion of the material ", which is typically a First In First Out (FIFO) buffer" corrects an error that would be self-evident to a person skilled in the art. Accordingly, deletion of ", which is typically a First In First Out (FIFO) buffer" does not introduce new matter into the disclosure.

The Examiner alleges that substitution of the term "buffer" for "FIFO" at page 7, line 7, page 10, lines 12, 26, and 27, page 11, line 30, and page 23, lines 29 and 30, introduces new matter into the disclosure.

Firstly, the preceding changes involve item 48. That is, "FIFO 48" has been changed to "buffer 48" at the foregoing places in the specification. A FIFO is a type of buffer. As indicated above, item 48 is first described as a "buffer" in the paragraph bridging pages 6 and 7 of the specification and is later described as typically being a FIFO buffer. Since item 48 is initially described in the specification as a "buffer", changing "FIFO 48" to "buffer 48" merely replaces one term employed in the original disclosure to describe item 48 with another term used in the original disclosure to describe item 48. Accordingly, changing

"FIFO" to "buffer" at the foregoing places in the specification does not introduce new matter into the disclosure.

Secondly, for the reasons presented above in connection with deleting ", which is typically a First In First Out (FIFO) buffer" from the paragraph bridging pages 6 and 7 of the specification, buffer 48 cannot actually be a FIFO. The change of "FIFO 48" to "buffer 48" corrects an error would be obvious to a person skilled in the art. This is an additional reason why changing "FIFO" to "buffer" at the indicated places in the specification does not introduce new matter into the disclosure.

The Examiner alleges that new matter is introduced into the disclosure by the term "video message" at page 9, line 30, page 10, line 7, and page 26, line 30, of the specification and by the term "audio message" at page 14, line 23, and page 27, line 3, of the specification.

The singular term "video message" has been inserted into the specification at page 9, line 30, and page 26, line 30, as an alternative expression for a "tag" containing certain video information provided from stream demultiplexer 26. At page 10, line 7, the plural term "video messages" has been similarly inserted into the specification as an alternative expression for "tags" containing certain video information supplied from stream demultiplexer 26. The singular term "audio message" has been inserted into the specification at page 14, line 23, and page 27, line 3, as an alternative expression for a "tag" containing certain audio information provided from demultiplexer 26.

On page 16 of the 10 December 2003 Amendment, Applicants' Attorney pointed out that "the specification has been brought into conformity with the original claims by incorporating the term "message" or "messages" from the original claims into the specification at appropriate points as an alternative expression for the term "tag" or "tags" in the same sense that "message" or "messages" was employed in the original claims". Each such "tag" or "message" may contain audio or video information as disclosed at numerous places in the specification. Applicants' Attorney further pointed out on page 17 of the 10 December 2003 Amendment that the claims utilize "the terms "video" and "audio" as modifiers for "message" or "messages" solely to distinguish the "messages" dealing with video information from the "messages" dealing with audio information."

Introduction of the term "video message" or "video messages" into the specification at page 9, line 30, page 10, line 7, and page 26, line 30, as an alternative expression for a

"tag" or "tags" containing video information is supported by the "message" language of the original claims for which the adjective "video" has been introduced simply to differentiate such messages containing video information from similarly generated messages containing audio information. Introduction of the term "audio message" into the specification at page 14, line 23, and page 27, line 3, as an alternative expression for a "tag" containing audio information is similarly supported by the "message" language of the original claims for which the adjective "audio" is now used simply to differentiate such messages containing audio information from similarly generated messages containing video information. For these reasons, insertion of the terms "video message", "video messages", and "audio message" into the specification at the indicated places does not introduce new matter into the disclosure.

The Examiner states that the language "the audio bit streams do contain start code patterns but they are not individually uniquely identifiable from the actual audio data, thereby making it difficult to detect the start of audio data frame" at lines 13 and 14 on page 14 of the specification "is different from the original sentence".

The material at lines 13 and 14 on page 14 of the specification is the last sentence of the first full paragraph on page 14. The last sentence of the first full paragraph on page 14 was indeed changed in the 11 February 2004 Amendment. However, the mere fact that an amendment changes certain material in the specification of a U.S. patent application does not automatically mean that the amendment introduces new matter into the specification.

On page 19 of the 11 February 2004 Amendment, Applicants' Attorney stated that:

The last sentence in the first full paragraph on page 14 recites that "Unlike the video bit streams, the audio bit streams do not contain unique and identifiable start code patterns (sync words), making it difficult to detect the start of an audio data frame". Inasmuch as the first full paragraph on page 15 recites that the audio data stream contains sync words, the quoted material from the first full paragraph on page 14 means that sync words are present in the audio bit stream but are simply not uniquely individually identifiable from the actual audio data.

More particularly, an audio sync word has the bit pattern of an audio level. Taking advantage of the fact that sound varies and is highly unlikely to be the same for three (consecutive) audio frames, the identification of three (consecutive) occurrences of a bit pattern for an audio sync word indicates that the bit pattern is indeed an audio sync word and not a corresponding audio level. See the first full paragraph on page 14. In light of the fact that

the audio bit stream does indeed contain audio sync words, the last sentence in the first full paragraph on page 14 has been revised to recite that "The audio bit streams contain start code patterns (sync words), but they are not individually uniquely identifiable from the actual audio data, thereby making it difficult to detect the start of an audio data frame".

For the preceding reasons, the revision of the material in the last sentence of the first full paragraph on page 14, i.e., the material at lines 13 and 14, does not introduce new matter into the disclosure.

The Examiner alleges that the material "consisting ... audio and video messages generating by SD 26 for use by CPU 54" at line 12 on page 26 of the specification constitutes new matter. This material forms the end of the second sentence in the first full paragraph on page 26 of the specification. As amended to add the language "consisting ... audio and video messages generating by SD 26 for use by CPU 54" and to change message queue "106" to message queue "120", the second sentence of the first full paragraph on page 26 of the specification reads:

Fig. 9 provides a message queue 120 in accordance with one embodiment of the present invention. Message queue 120 includes tags consisting of the above-mentioned audio and video messages generated by SD 26 for use by CPU 54.

The remainder of the material in the first full paragraph on page 26 of the specification has been amended to make several reference symbol corrections, to correct a figure-identification error, and to parenthetically insert "video message" between "tag" and "such as". As amended, the remainder of the first full paragraph on page 26 of the specification reads:

Message queue 120 is a FIFO queue stored in a sub-buffer of buffer 48 of Fig. 1. In particular, when SD 26, as discussed above with respect to Figs. 1 and 2A - 2C, identifies significant information such as the location of the start of a new video frame or a presentation time stamp of a particular video frame, then SD 26 generates a tag (video message) such as a tag 122 and stores tag 122 in message queue 120. In one embodiment, SD 26 generates a message that audio or video data is stored in buffer 48 of Fig. 1 and ready for decoding even prior to storing all the audio or video data, respectively, in buffer 48. CPU 54 periodically accesses message queue 120 (e.g., every Vsync) and reads the tags in real time.

As indicated above, the first full paragraph on page 26 of the specification originally provided that the message queue stores tags generated by stream demultiplexer 26. Since the

earlier insertion of the term "message" as an alternative expression for a "tag" generated by stream demultiplexer 26 brings the specification into conformity with the original claims and since a "tag" stored in the message queue is generated by demultiplexer 26, insertion of "consisting ... audio and video messages generating by SD 26 for use by CPU 54" at the end of the second sentence in the first full paragraph on page 26 of the specification brings the second sentence of the first full paragraph on specification page 26 into conformity with the original claims. Insertion of "consisting ... audio and video messages generating by SD 26 for use by CPU 54" at the end of the second sentence in the first full paragraph on specification page 26, i.e., at line 12, thus does not introduce new matter into the disclosure.

For the preceding reasons, none of the objected-to material introduces new matter into the disclosure. The 35 USC 132 new-matter objection should be withdrawn.

Turning to the claims, Applicants' Attorney made the following remarks on page 11 of the 10 December 2003 Amendment in regard to the revisions of Claims 41, 51, 67, and 74:

Claims 41, 51, 67, and 74 originally recited that the control unit was provided "with" the video and audio messages. Although the control unit does receive these messages, they can be temporarily stored in a holding site separate from the control unit. For example, as described in the specification at pages 26 and 27 and covered in Claim 57, the messages can be stored in a message queue where they are available to the control unit. To make it clear that the messages are not necessarily provided directly to the control unit, Claims 41, 51, 67, and 74 have been amended to recited that the video and audio messages have been provided "for use by the control unit". Claims 42, 43, 57, and 59 have been amended to conform to the revised version of Claim 41.

In apparent response to the preceding remarks, the Examiner states on page 8 of the Office Action that:

[T]he applicant states that the audio and video messages are provide to the CPU via buffer message. In reply, the specification states that the SD uses a tag in the message queue for generating an interrupt signal to CPU. The message queue does not provide video or audio message to the CPU for processing (See page 27, lines 7-20 and page 28, lines 8-10).

From the tenor of the preceding comments, it appears that the Examiner does not understand how the present decoder operates. The first full paragraph on page 26 of the specification provides that "SD 26 generates a tag such as a tag 108 and stores tag 108 in message queue 106" and later that "CPU 54 periodically accesses message queue 106 (e.g., every Vsync) and reads the tags in real time". Similarly, the paragraph bridging pages 27

and 28 of the specification states that "CPU 54 typically can access the tags in message queue 106 and process the tags appropriately to program audio decoder 34 of Fig. 1 or video decoder 36 of Fig. 1 appropriately in real time". Since CPU 54 reads the tags which are generated by stream demultiplexer 26 and which are stored in message queue "106", now renumbered "120", the remarks made by Applicants' Attorney on page 11 of the 10 December 2003 Amendment in connection with the revisions to Claims 41, 51, 67, and 74 are correct.

With respect to the Examiner's allegation that the material at page 27, lines 7 - 20, and page 28, lines 8 - 10, of the specification shows that the "message queue does not provide video or audio message to the CPU for processing", the Examiner appears to have misconstrued the material at lines 7 - 20 on specification page 27. More particularly, the specification provides on page 27, lines 7 - 20, i.e., the first full paragraph, that:

Accordingly, SD 26 performs time/space multiplexing that allows CPU 54 to function in a batch mode rather than generating interrupts to CPU 54 each time a significant piece of information is identified by SD 26. For example, message queue 106 as used by SD 26 represents an alternative approach to having SD 26 generate interrupts to CPU 54 each time SD 26 identifies significant information (the interrupt approach). The interrupt approach is inefficient, because every time an interrupt is generated for CPU 54, CPU 54 spends a few cycles processing the interrupt. Thus, SD 26 advantageously uses message queue 106 to implement a hardware-based messaging system (hardware-based tagging mechanism).

By the language "message queue 106 as used by SD 26 represents an alternative approach to having SD 26 generate interrupts to CPU 54 each time SD 26 identifies significant information (the interrupt approach)", the first full paragraph on page 27 of the specification is making a comparison between (a) the previously described inventive audio/video decoding system in which tags or messages generated by the stream demultiplexer are stored in the message queue and are made available from the message queue to the CPU without having to interrupt the CPU and (b) some other audio/video decoding system which has a stream demultiplexer for generating tags or messages for the CPU, which apparently lacks a message queue, and whose CPU is interrupted when it is to receive the tags or messages from the stream demultiplexer.

The next two sentences in the full paragraph on specification page 27 explain why the inventive message-queue-based audio/video decoding system that avoids interrupting the

CPU when it receives stream-demultiplexer-generated messages stored in the message queue is advantageous over this other audio/video decoding system whose CPU is interrupted to receive tags or messages from the stream demultiplexer. Contrary to what the Examiner alleges, the specification discloses that the inventive audio/video decoding system employs a message queue for storing audio and video messages which are generated by the stream demultiplexer and which are provided to the CPU.

With respect to the Examiner's citation of the material at page 28, lines 8 - 10, of the specification as allegedly showing that "the message queue does not provide video or audio message to the CPU for processing", the specification states at lines 8 - 10 on page 28 that "Alternatively, SD 26 may in all or some cases also raise an interrupt to CPU 54 when generating a tag for message queue 106". By this sentence, the specification discloses an alternative operational mode in which the stream demultiplexer interrupts the CPU when the stream demultiplexer generates tags or messages and supplies those tags or messages to the message queue for use by the CPU. Although this alternative mode involves interrupting the CPU, the messages generated by the stream demultiplexer are still provided to the message queue for use by the CPU in the alternative operational mode. The material at page 28, lines 8 - 10, of the specification does not support the Examiner's allegation that the "message queue does not provide video or audio message to the CPU for processing".

Claims 41 - 82 have been rejected under 35 USC 112 as failing to comply with the written description requirement on the grounds that "The claim(s) contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention". This rejection is respectfully traversed.

With respect to Claims 41 and 67, the Examiner alleges that the limitation that the data packets be demultiplexed and depacketized without interrupting the control unit is not supported by the specification. On page 11 of the 10 December 2003 Amendment, Applicants' Attorney pointed out that this limitation has two basic components: (a) a demultiplexing/depacketizing sublimitation and (b) a non-interruption sublimitation.

Applicants' Attorney first showed that the sublimitation that the data packets be demultiplexed and depacketized is supported at various places in the specification. Applicants' Attorney specifically pointed to certain material on pages 2, 7, and 8 of the

specification as supporting the demultiplexing/depacketizing sublimitation. Rather than repeat that material here, the Examiner is simply referred to pages 11 and 12 of the 10 December 2003 Amendment.

Applicants' Attorney next showed that the sublimitation that the demultiplexing and depacketizing be done "without" interrupting the CPU is supported in the specification. On page 12 of the 10 December 2003 Amendment, Applicants' Attorney particularly stated that:

The sublimitation that the demultiplexing/depacketizing be done "without" interrupting the control unit is likewise supported in the specification. In the Summary section on page 3, the specification states in the second paragraph that "in a steady state and under normal operating conditions, the CPU is interrupted only when the synchronization signal arrives [emphasis added] thereby significantly reducing the number of interrupts that the CPU must service". The specification similarly states in the Detailed Description in the paragraph bridging pages 11 and 12 that "in a steady state and under most operating conditions, CPU 54 is interrupted only when a tag is present at the occurrence of a subsequent Vsync signal [emphasis again added]; this is an advantage of the DVD/DVB decoder 20 which generates fewer interrupts than do other known systems".

The "control unit" of Claims 41 and 67 is embodied by the CPU mentioned in the material quoted from the pages 3, 11, and 12. As provided on pages 3 and 9, the video output processor (40) generates the synchronization signal (Vsync). Since the synchronization signal causes the video and audio decoders to decode the video and audio data produced from the demultiplexed and depacketized incoming data stream, the demultiplexing and depacketizing of the data packets is performed without interrupting the control unit.

On page 12 of the 10 December 2003 Amendment, Applicants' Attorney further pointed out that the paragraph bridging pages 11 and 12 of the specification states that because interrupts are only generated during Vsync occurrences in steady state:

CPU 54 advantageously has an entire Vsync time period (i.e., the time interval between two successive Vsync signals) to service those interrupt. In particular, when a Vsync signal arrives, CPU reads FIFO 48 to determine whether SD 26 has generated any tags. If one or more tags exist, CPU performs its assigned tasks and generates corresponding TDPs. However, CPU 54 has the entire period from the reading of the tags until the arrival of the next Vsync signal to complete all of its tasks including the generation of the TDPs. Hence, CPU 54 may continue to finish its ongoing tasks uninterrupted, provided, however, that CPU 54 services the requested interrupt prior to the arrival of the next Vsync signal. Therefore, decoder 20 benefits from very relaxed timing requirements. The relaxed timing requirements resulting from the availability of an entire Vsync period to CPU

54 to read the tags and to generate corresponding TDPs is a significant advantage of DVD decoder 20 over the known DVD decoders which because they require their CPU control units (e.g. CPU) to immediately--but temporarily--abandon their ongoing tasks to service the interrupts in a very short time period, impose tight and rigid system timing requirements.

Because interruptions of the control unit occur only at occurrences of the Vsync signal during steady-state operation and because the Vsync signal causes the video and audio decoders to decode the encoded video and audio data produced from the demultiplexed and depacketized incoming data stream, the demultiplexing and depacketizing of the data packs in the incoming data stream is done without interrupting the control unit as pointed out on page 13 of the 10 December 2003 Amendment.

Turning to message queue "106", Applicants' Attorney stated on page 13 of the 10 December 2003 Amendment that:

In the preferred embodiment described in the specification, the video messages which identify where the encoded video data is stored in the video input buffer and which also deal with the video timing information are provided by stream demultiplexer 26 to message queue 106 where those video messages are available to CPU 54. The audio messages which identify where the encoded audio data is stored in the audio input buffer and which also deal with the audio timing information are, in the preferred embodiment, similarly provided by stream demultiplexer 26 to message queue 106 where those audio messages are available to CPU 54. This (temporary) storage site for the video and audio messages is described in pages 26 and 27 of the specification.

After noting that page 27 of the specification discloses how message queue 106 enables stream demultiplexer 26 to avoid interrupting CPU 54 in the course of demultiplexing and depacketizing the data packets, Applicants' Attorney pointed out on page 13 of the 10 December 2003 Amendment that the second paragraph on page 27 of the specification states that:

Accordingly, SD 26 performs time/space multiplexing that allows CPU 54 to function in a batch mode rather than generating interrupts to CPU 54 each time a significant piece of information is identified by SD 26. For example, message queue 106 as used by SD 26 represents an alternative approach to having SD 26 generate interrupts to CPU 54 each time SD 26 identifies significant information (the interrupt approach). The interrupt approach is inefficient, because every time an interrupt is generated for CPU 54, CPU 54 spends a few cycles processing the interrupt. Thus, SD 26 advantageously uses message queue 106 to implement a hardware-based messaging system (hardware-based tagging mechanism).

The quoted material from page 27 of the specification shows how stream demultiplexer 26 preferably does its demultiplexing and depacketizing tasks without interrupting CPU 54 and further supports the limitation of Claims 41 and 67 that the demultiplexing and depacketizing of data packets be performed without interrupting the recited control unit.

In response to preceding material, the Examiner alleges on page 9 of the Office Action that:

[T]he examiner does not see any thing which discloses 'a demultiplex and depacketize the data packets without interrupting the control unit'. Furthermore, the specification 26 and 27 clearly discloses the tags used to generate an interrupt signal to CPU during the time that SD demultiplexes and depacketizes the data packets.

Applicants' Attorney respectfully requests the Examiner to again review the indicated portions of the specification because those portions clearly disclose that demultiplexing and depacketizing of the data packets is done without interrupting the control unit, i.e., CPU 54, in the inventive audio/video decoding system described in those portions of the specification.

Insofar as the sentence "For example, message queue 106 as used by SD 26 represents an alternative approach to having SD 26 generate interrupts to CPU 54 each time SD 26 identifies significant information (the interrupt approach)" in the full paragraph on specification page 27 may serve as a basis for the Examiner's allegation that pages 26 and 27 of the specification disclose "the tags used to generate an interrupt signal to CPU during the time that SD demultiplexes and depacketizes the data packets", the Examiner would appear to have misconstrued this sentence. As pointed out above, the specification language "message queue 106 as used by SD 26 represents an alternative approach to having SD 26 generate interrupts to CPU 54 each time SD 26 identifies significant information (the interrupt approach)" makes a comparison between (a) the previously described inventive audio/video decoding system in which the message queue stores messages generated by the stream demultiplexer and made available to the CPU without interrupting the CPU and (b) some other audio/video decoding system whose CPU is interrupted to receive messages from the stream demultiplexer. The interruption of the CPU in conjunction with the demultiplexing and depacketizing of the data packets occurs in this other audio/video decoding system, not in the inventive audio/video decoding system described in that part of the specification.

The Examiner again seems to allege that the terms "video message" (or "video messages") and "audio message" (or "audio messages") in Claims 41 - 43, 51, 52, 57, 59, 67 - 69, 74, and 75 are not supported by the specification.

On pages 14 - 16 of the 10 December 2003 Amendment, Applicants' Attorney showed why "video message", "video messages", "audio message", and "audio messages" are supported in the specification. Instead of repeating those comments, the Examiner is referred to pages 14 - 16 of the 10 December 2003 Amendment.

Responsive to the comments made on pages 14 - 16 of the 10 December 2003 Amendment, the Examiner alleges on page 9 of the Office Action that "Examiner disagrees with the applicant because the specification discloses a tag that includes these items not audio or video message". In this allegation, the Examiner appears to be relying on the Examiner's earlier-stated position that the original disclosure does not provide support for stream-demultiplexer-provided "messages".

The Examiner's position is incorrect as pointed out above. Since the original disclosure provides support for stream-demultiplexer-generated "messages", the use of "video message", "video messages", "audio message", and "audio messages" in Claims 41, 43, 51, 52, 57, 59, 67 - 69, 74, and 75 is supported in the specification where, again, the adjectives "video" and "audio" are merely employed to distinguish messages containing video data from messages containing audio data.

For the reasons presented above and in the 10 December 2003 Amendment, the 35 USC 112 lack-of-support rejection should be withdrawn.

Claims 41 - 82 have again been rejected under 35 USC 112 as indefinite for failing to particularly point out and distinctly claim the invention. The Examiner again alleges that the term "video messages" in Claims 41 and 67 and the term "audio messages" in Claims 51, 52, 74, and 75 are indefinite. This rejection is respectfully traversed.

On pages 16 and 17 of the 10 December 2003 Amendment, Applicants' Attorney explained why the 35 USC 112 indefiniteness rejection should be withdrawn. All of that explanation still applies. For simplicity, the Examiner is referred to pages 16 and 17 of the 10 December 2003 Amendment.

More particularly, the Examiner again "alleges that "The term 'video messages' in claims 41 and 67 are used by the claim to mean 'tags which contain the timing and addresses of storage location for encoded video data in the video buffer' while the accepted meaning is 'video picture.'". In a footnote to the remarks on pages 16 and 17 of the 10 December 2003 Amendment, Applicants' Attorney noted this allegation and stated that:

Referring to the language employed in Claim 48, the "tags which contain the timing information and the addresses of storage locations for the encoded video data in the video input buffer" are not data that contains the substantive details of the picture being presented but instead are data that deals with where the substantive picture details are located and when the substantive picture data is to be decoded and presented. If the Examiner is attempting to say that "video picture" is the accepted term for "tags which contain the timing information and the addresses of storage locations for the encoded video data in the video input buffer" and if this 35 USC 112 indefiniteness rejection is continued, Applicants' Attorney requests the Examiner to provide Applicants' Attorney with material that supports the Examiner's allegation.

The Examiner has not responded to this request.

The Examiner again further alleges "that "The term 'audio messages' in claims 51-52 an [sic, and] 74-75 are used by the claim to mean 'audio timing information and the location of encoded audio data in the audio buffer', while the accepted meaning is 'audio data'".

In the preceding footnote to the remarks on pages 16 and 17 of the 10 December 2003 Amendment, Applicants' Attorney noted this further allegation and stated that:

The "audio timing information and the location of the encoded audio data in the audio buffer" is not data that contains the substantive details of the sound being presented but instead is data that deals with where the substantive sound data is located and when the substantive sound data is to be decoded and presented. If the Examiner is attempting to say that "audio data is the accepted term for "audio timing information and the location of encoded audio data in the audio buffer" and if this rejection is continued, Applicants' Attorney requests the Examiner to provide Applicants' Attorney with material supporting the Examiner's further allegation.

The Examiner has not responded to this request either.

If the Examiner still believes that the "video timing information" and "audio timing information" language should be changed in the indicated manner, the Examiner should respond to the preceding requests. In the absence of such a response, Applicants' Attorney cannot assess the merits of the Examiner's position.

Additionally, the Examiner alleges that "to demultiplex and depacketize the data packets without interrupting the control unit" in Claims 41 and 67 "is vague and indefinite [because] it is a negative limitation".

The fact that a limitation in a U.S. patent claim may be viewed as a negative limitation does not automatically make such a limitation vague and indefinite. For example, the term "spaced apart" means "not in contact with" and thus could be construed as a negative limitation. However, the term "spaced apart" appears in many U.S. patent claims and rarely, if ever, is objected to as being a negative limitation so as to make a claim vague or/and indefinite.

To the extent that the language "to demultiplex and depacketize the data packets without interrupting the control unit" in Claims 41 and 67 might be viewed as a negative limitation, the Examiner has not shown specifically why this language is vague and indefinite. Applicants' Attorney sees nothing that causes the language "to demultiplex and depacketize the data packets without interrupting the control unit" to be vague or/and indefinite. In the absence of a specific explanation from the Examiner as to why the language "to demultiplex and depacketize the data packets without interrupting the control unit" is felt to be vague and indefinite, the Examiner's allegation in this regard is inappropriate.

For the reasons presents above and in the 10 December 2003 Amendment, the 35 USC 112 indefiniteness rejection should be withdrawn.

Claims 41 - 52, 55 - 60, 62 - 75, and 78 - 82 have been rejected under 35 USC 103(a) as obvious based on Okada et al. ("Okada"), U.S. Patent 5,668,601, in view of Maturi et al. ("Maturi"), U.S. Patent 5,559,999. This rejection is respectfully traversed.

The Examiner's rationale for the present prior art rejection is substantially the same as the rationale presented in the previous Office Action mailed 11 August 2003 for rejecting Claims 41, 48 - 52, 55 - 58, 62 - 67, 74, 75, 78, 81, and 82 under 35 USC 103(a) as obvious based on Okada and Maturi except for (a) minor changes made to accommodate the revised wording of independent Claims 41 and 67 and (b) the new clause stating that Maturi's "video decoder decoded the video signal based on interrupt signal in response to sync signal (Fig 7 and col. 6, lines 58 to col. 7, lines 21)". In particular, the Examiner again alleges that the

motivation for combining Maturi with Okada "would have been to synchronize the video and audio data".

On pages 20 and 21 of the 10 December 2003 Amendment, Applicants' Attorney pointed out that the Examiner's rationale for combining Okada and Maturi is illogical because the decoding of the audio and video data is already synchronized in the decoding systems of each of Okada and Maturi. Hence, there would be no need for using an additional synchronization technique, such as that described in Maturi, for synchronizing Okada's video and audio data. Attempting to combine Okada and Maturi would probably lead to a destructive synchronization result and, in any event, would not produce a constructive synchronization result.

Applicants' Attorney specifically stated on pages 20 and 21 of the 10 December 2003 Amendment that:

The Examiner's rationale for combining Okada and Maturi is illogical. Synchronism of Okada's audio and video data, i.e., synchronism of the times at which the audio and video data are decoded by decode core circuits 13 and 23 for presentation is already achieved by controllers 14 and 24 in response to the system clock reference based on the audio and video presentation time stamps. There is no need for using an additional technique, such as that disclosed in Maturi, for synchronizing Okada's audio and video data. Consequently, there is no motivation for applying Maturi to Okada in the manner, and for the reasons, proposed by the Examiner.

Modifying Okada's decoding system to include both Okada's current technique for synchronizing the decoding and presentation of the audio and video data and Maturi's technique for synchronizing the decoding and presentation of the audio and video data would simply increase the amount of circuitry, and associated cost, without providing a significant (if any) improvement in performance. In fact, compatibility problems could arise from the presence of two systems for synchronizing the decoding and presentation of the audio/video data, e.g., when the decoding/presentation times determined by one of the synchronization systems differs from the decoding/presentation times determined by the other synchronization system. A person skilled in the art would not modify Okada's decoding system to include both techniques for synchronizing the decoding and presentation of the audio and video data.

As pointed out above, host microcontroller 18 in Maturi is interrupted during the demultiplexing and depacketizing of the incoming audio/video data stream to retrieve the video timing information, namely the video presentation time stamps, from pre-parser 22. Claims 41 and 67 each require that the demultiplexing and depacketizing of the data packs be done without

interrupting the control unit. Even if there was some motivation for modifying Okada's decoder to include Maturi's technique for synchronizing the decoding and presentation of the audio and video data as a replacement for Okada's current technique for synchronizing the decoding and presentation of the audio and video data, the utilization of Maturi's synchronization technique would require that the control unit in the so-modified decoding system be interrupted during the demultiplexing and depacketizing of the incoming audio/video data stream to obtain the video timing information present in the incoming data stream. Accordingly, the so-modified decoding system would not meet the limitation of Claim 41 or 67 that the demultiplexing and depacketizing of the data packs be done without interrupting the control unit.

In short, there is no motivation for combining Okada and Maturi in the proposed manner. Modifying Okada's decoding system to include system to include both Okada's current technique for synchronizing the decoding and presentation of the audio and video data and Maturi's technique for synchronizing the decoding and presentation of the audio and video data leads to a non-useful result. Replacing Okada's current system for synchronizing the decoding and the presentation of the audio and video data with Maturi's system for synchronizing the decoding and presentation of the audio and video data would, even if some motivation could be found to do so, not result in a system that meets all the limitations of Claim 41 or 67. Hence, Claims 41 and 67 are patentable over Okada and Maturi.

In response to the preceding remarks, the Examiner states on pages 9 and 10 of the Office Action that:

[T]he examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Okada discloses a method and system for demultiplexing the mpeg signal into video for storing in buffer 12, audio for storing in buffer 22, video PTS for storing in register 21 and audio PTS for storing in register 11, wherein the PTS is used to generate a tag includes PTS and a address of the video data that stored in the buffer 22 without interrupt the controller, See Fig 4 and 7. Maturi discloses a method and system for demultiplexing and depacketizing the mpeg signal into video data 20b, audio data 20d, video header 20a, audio header 20c, which includes a tag and PTS. Upon detecting the tag and PTS an interrupt signal is forwarded to CPU in order to allow the CPU for storing the information in a list "RAM" to be used by the control unit (See col. 2, lines 65 to col. 3, lines 6; See col. 5, lines 37 to col. 6, lines 48). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to apply a method of providing a control unit with tags that includes timing and location of the encoded audio and video data as disclosed by Maturi into Okada's system.

The Examiner concludes these comments with the allegation that the motivation to combine Okada and Maturi "would have been to synchronize the video and audio data" and that "The teaching of the references performs the claimed invention".

The entire teaching of a reference employed in rejecting a claim in a U.S. patent application must be considered in making the rejection. It is impermissible to utilize part of the reference's teaching in making the rejection while ignoring another part which mandates against the rejection.

In the present circumstances, the video and audio data is synchronized in both Okada's decoding system and Maturi's decoding system. Despite this, the Examiner attempts to apply Maturi's technique for handling video and audio messages to Okada's decoding system on the alleged grounds that synchronization of the video and audio data provides motivation for applying Maturi to Okada. In doing so, the Examiner ignores the fact that the video and audio data is already synchronized in Okada. This is impermissible.

The Examiner may not ignore the fact that Okada's video and audio data is already synchronized. Since the pre-existent synchronization of the video and audio data in Okada must be considered in attempting to combine Okada with another reference, synchronization of the video and audio data cannot provide motivation for combining Okada with another prior art document such as Maturi. Nor, as far as Applicants' Attorney can determine, is there any other motivation for combining Okada and Maturi in the manner proposed by the Examiner. No person skilled in the art would combine Okada and Maturi in the proposed manner for the reasons given by the Examiner or, as far as Applicants' Attorney can determine, for any other reasons. Independent Claims 41 and 67 are therefore patentable over Okada and Maturi.

Claims 42 - 52, 55 - 60, and 62 - 66 all depend from (directly or indirectly) from Claim 41. Claims 68 - 75 and 78 - 82 all depend (directly or indirectly) from Claim 67. Hence, Claims 42- 52, 55 - 60, 62 - 66, 68 - 75, and 78 - 82 are patentable over Okada and Maturi for the same reasons as Claims 41 and 67.

Claims 53, 54, 76, and 77 have again been rejected under 35 USC 103(a) as obvious based on Okada and Maturi in view of Nuber et al. ("Nuber"), U.S. Patent No. 5,703,877. Claim 61 has again been rejected under 35 USC 103(a) as obvious based on Okada and

Maturi in view of Terashima et al. ("Terashima"), U.S. Patent No. 6,163,647. These rejections are respectfully traversed.

Claims 53, 54, and 61 each depend (directly or indirectly) from Claim 41 rejected as obvious based on Okada and Maturi. Claims 76 and 77 each depend (directly or indirectly) from Claim 67 likewise rejected as obvious based on Okada and Maturi. For the reasons presented above, Claims 41 and 67 are not obvious based on Okada and Maturi. Nothing in Nuber or/and Terashima would justify combining Okada and Maturi so as to make Claim 41 or 67 obvious. Claims 53, 54, 61, 76, and 77 are thus variously patentable over Okada, Maturi, and Nuber or Terashima for the same reasons that Claims 41 and 67 are patentable over Okada and Maturi.

In short, the 35 USC 112 lack-of-support and indefiniteness rejections should be withdrawn. Claims 41 - 82 have been shown to be patentable over the applied art. Accordingly, Claims 41 - 82 should be allowed so that the application may proceed to issue.

Please telephone Attorney for Applicant(s) at 650-964-9767 if there are any questions.

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Respectfully submitted,



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